

CLAIMS

1. A communication system comprising:

a plurality of communication devices connected to a transmission line adjust transmission timing of data based
5 on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing transmission/reception of the data,

wherein each of said communication device including a transmission control unit which transmits the data to the
10 transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone when newly transmitting the data and, transmits the data to the transmission line before the
15 first time when transmitting a data whose priority is high.

2. The communication system according to claim 1, wherein the data whose priority is high is ACK data representing a reception confirmation.

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3. The communication system according to claim 1, wherein the data whose priority is high is NACK data representing a non-reception confirmation with respect to reception of a series of data groups to which sequence numbers are
25 assigned.

4. A communication system comprising:

a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing transmission/reception of the data via the master communication device,

wherein the master communication device including a transmission control unit which transmits the data to the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone when newly transmitting the data and, transmits the data to the transmission line before the first time when transmitting a data that has been relayed.

5. A communication system comprising:

a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between

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signals, thereby performing transmission/reception of the data via the master communication device,

wherein the master communication device including a transmission control unit which transmits the data to the

5 transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone when newly transmitting the data and,

transmits ACK data representing a reception confirmation of the data after the reception of the data is confirmed before the first time and transmits the data relayed to the transmission line before the first time from a time when a carrier signal of the ACK data is gone when receiving a data that has been relayed.

15 6. A communication system comprising:

a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing transmission/reception of the data via the master communication device,

25 wherein the master communication device including a

transmission control unit which transmits the data to the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the
5 transmission line is gone when newly transmitting the data and, in a case where multi-address data relayed is received, repeating processing in which the master communication device transmits ACK data representing a reception confirmation of the data after the reception of the data
10 is confirmed before the first time, transmits the multi-address data relayed to the transmission line before the first time from a time when a carrier signal of the ACK data is gone, and transmits the multi-address data before the first time from a time when a carrier signal of the
15 multi-address data is gone.

7. A communication system comprising:

a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing transmission/reception of the
25 data via the master communication device,

wherein the communication device including a transmission control unit which transmits the data to the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone in a case where the communication device newly transmits data and transmits collision avoidance data that is arbitrary data generating a carrier signal on the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone and transmits the multi-address data before the first time from a time when a carrier signal of the collision avoidance data is gone in a case where multi-address data is transmitted,

wherein a transmission control unit of the master communication device, when receiving the multi-address data, repeats a processing in which the multi-address data is transmitted to the transmission line before the first time from a time when the carrier signal of the multi-address data is gone.

8. A communication system comprising:

a plurality of communication devices connected to a transmission line are divided into one master communication

device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between
5 signals, thereby performing transmission/reception of the data via the master communication device,

wherein the communication device includes a transmission control unit which transmits the data to the transmission line at a random time randomly representing
10 a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone in a case where the communication device newly transmits data and, transmits collision avoidance data that is arbitrary data generating a carrier
15 signal on the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone and transmits the data whose priority is high before the first time from a time when a
20 carrier signal of the collision avoidance data is gone when transmitting a data whose priority is high,

wherein a transmission control unit of the master communication device, when the data whose priority is high is received, transmits the data whose priority is high to
25 the transmission line before the first time from a time when

the carrier signal of the data whose priority is high is gone.

9. A communication device employed in a communication system, the communication system including a plurality of communication devices connected to a transmission line adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing transmission/reception of the data, the communication device comprising:

a transmission control unit which transmits the data to the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone when newly transmitting the data and, transmits the data to the transmission line before the first time when transmitting a data whose priority is high.

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10. A communication device employed in a communication system, the communication system including a plurality of communication devices connected to a transmission line adjust transmission timing of data based on a detection result of a carrier signal of another communication device

to prevent a collision between signals, thereby performing transmission/reception of the data, the communication device comprising:

a transmission control unit which transmits the data

5 to the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone when newly transmitting the data and, transmits collision avoidance data that is

10 arbitrary data generating a carrier signal on the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone and transmits the data whose

15 priority is high to the transmission line before the first time from a time when a carrier signal of the collision avoidance data is gone when transmitting a data whose priority is high.

20 11. A communication method in which a plurality of communication devices connected to a transmission line adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing

25 transmission/reception of the data, the communication

method comprising:

a data transmission step of transmitting the data to the transmission line at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone when newly transmitting the data; and

a priority data transmission step of transmitting the data whose priority is high to the transmission line before the first time in a case where a transmission request of data whose priority is high is generated.

12. The communication method according to claim 11, wherein the data whose priority is high is ACK data representing a reception confirmation.

13. The communication method according to claim 11, wherein the data whose priority is high is NACK data representing a non-reception confirmation with respect to reception of a series of data groups to which sequence numbers are assigned.

14. A communication method in which a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave

communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals,

5 thereby performing transmission/reception of the data via the master communication device, the communication method comprising:

a data transmission step of transmitting the data to the master communication device at a random time randomly
10 representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone in a case where a slave communication device of a transmission source transmits data whose transmission is requested;

15 a data relay step in which the master communication device that has received the data receives the data and transmits the data to a slave communication device of a transmission destination before the first time elapses from a time when a carrier signal of the data on the transmission
20 line is gone;

an ACK transmission step in which the slave communication device of the transmission destination transmits ACK data representing a reception confirmation to the master communication device after the reception of
25 the data is confirmed before the first time; and

an ACK relay transmission step in which the master communication device that has received the ACK data receives the ACK data and transmits the ACK data to the slave communication device of the transmission source before the
5 first time elapses from a time when a carrier signal of the ACK data on the transmission line is gone.

15. A communication method in which a plurality of communication devices connected to a transmission line are
10 divided into one master communication device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals,
15 thereby performing transmission/reception of the data via the master communication device, the communication method comprising:

a data transmission step of transmitting the data to the master communication device at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time when a carrier signal on the transmission line is gone in a case where a slave communication device of a transmission source transmits data whose transmission is requested;

25 an ACK transmission step in which the master

communication device that has received the data transmits ACK data representing a reception confirmation to the slave communication device of the transmission source after the reception of the data is confirmed before the first time;

5 and

a data relay transmission step in which the master communication device transmits the data to a slave communication device of a transmission destination after the transmission of the ACK data before the first time from
10 a time when a carrier signal of the ACK data is gone.

16. A communication method in which a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave communication devices to logically form a star-type connection and adjust transmission timing of data based on a detection result of a carrier signal of another communication device to prevent a collision between signals, thereby performing transmission/reception of the data via
20 the master communication device, the communication method comprising:

25 a multi-address data transmission step of transmitting the multi-address data to the master communication device at a random time randomly representing a time existing after a first time elapses until a second time elapses from a time

when a carrier signal on the transmission line is gone in a case where a slave communication device of a transmission source transmits multi-address data whose transmission is requested;

5 an ACK transmission step in which the master communication device that has received the multi-address data transmits ACK data representing a reception confirmation to the slave communication device of the transmission source after the reception of the multi-address

10 data is confirmed before the first time; and

 a multi-address data relay transmission step of repeating processing in which the master communication device transmits the multi-address data to a slave communication device of a transmission destination after

15 the transmission of the ACK data before the first time from a time when a carrier signal of the ACK data is gone and transmits the multi-address data to a slave communication device of a transmission destination before the first time from a time when a carrier signal of the multi-address data

20 is gone.

17. A communication method in which a plurality of communication devices connected to a transmission line are divided into one master communication device and other slave

25 communication devices to logically form a star-type

connection and adjust transmission timing of data based on
a detection result of a carrier signal of another
communication device to prevent a collision between signals,
thereby performing transmission/reception of the data via
5 the master communication device, the communication method
comprising:

a collision avoidance data transmission step of
transmitting collision avoidance data that is arbitrary data
generating a carrier signal on the transmission line at a
10 random time randomly representing a time existing after a
first time elapses until a second time elapses from a time
when a carrier signal on the transmission line is gone in
a case where a slave communication device of a transmission
source transmits multi-address data whose transmission is
15 requested;

a multi-address data relay transmission step in which
the slave communication device of the transmission source
transmits the multi-address data to the master communication
device before the first time from a time when a carrier signal
20 of the collision avoidance data is gone; and

an multi-address data relay transmission step of
repeating processing in which the master communication
device that has received the multi-address data transmits
the multi-address data to a slave communication device of
25 a transmission destination before the first time from a time

when a carrier signal of the multi-address data is gone and transmits the multi-address data to a slave communication device of a transmission destination before the first time from a time when a carrier signal of the multi-address data
5 is gone.